KOPIO
WBS Dictionary

WBS

1.2.8

Number	Description

1.2.8   **DAQ**

1.2.8.1   **Event Builder**

The event builder builds complete events from event fragments sent by the front-end electronics. It is based on a cluster of PC's communicating through a network switch.

1.2.8.1.1   **Event Builder System Development**

1.2.8.1.1.1   **Software development**

Procurement of test cluster for DAQ development: 4 PC's with PCI Express internal bus, dual 3 GHz Xeon, Infiniband-4x HCA, 8-port Infiniband-4x switch, 4 Infiniband-4x cables.

1.2.8.1.1.2   **Installation of XDAQ tools**

Installation of XDAQ software tools on test cluster.

1.2.8.1.1.3   **Simple data transfer tests**

Simple tests of data transfer speed through Infiniband network

1.2.8.1.1.4   **Tests in XDAQ framework**

Simple EB system running in XDAQ Implementation of a 2input-2output event builder on the test cluster, using the XDAQ Tool set

1.2.8.1.1.5   **Measurement of data transfer speed**

Measurements of data transfer speed through event builder, comparisons with ethernet, identification of bottlenecks Preparation involves development of software for front-end readout, run control, event logger, integration with event builder and level 3 t

1.2.8.1.2   **Event builder beam test**

1.2.8.1.2.1   **Preparation for beam test**

My assumption here is that we will have a beam test of preradiator and calorimeter systems at around

1.2.8.1.2.2   **Beam test**

Test beam run of combined preradiator-calorimeter system

1.2.8.1.3   **Design modification and review**

Develop needed design modifications based on experience of beam test. Culminates in preliminary design review of the event builder system on 4/30/07.

1.2.8.1.4   **EB procurement (25%)**

Procurement of 25% of the hardware needed for the event builder 1. 20 PC's. Unit PC cost based on Dell PowerEdge 2850 with dual 10-GHz Xeon, 4GB RAM, 4x-Infiniband HCA. Dual-port gigabit ethernet card. 2. 32-port 4x-Infiniband switch 3. 20 Infiniband ca

1.2.8.1.5   **Final design test**

Tests with the "25%" event builder and L3 trigger. Monte Carlo events for input, passed through event builder and L3 trigger systems. Performance checks of the hardware. Culminates in final design review on 4/30/08.

1.2.8.1.6   **EB procurement (75%)**

Procurement of remaining event builder hardware: 1. 60 PC's 2. 100-port Infiniband switch 3. 60 Infiniband cables

1.2.8.1.7   **Integration**

Installation of event builder, integration with front-end electronics, integration with L1/L3 trigger, run control

1.2.8.2   **Level 3 trigger**

The level 3 trigger operates on complete events output by the event builder. The trigger selects those events that are thought to be most interesting for sending to mass torage and later physics analysis. The L3 trigger may also perform detector calibra

1.2.8.2.1   **Level 3 trigger System Development**

1.2.8.2.1.1   **Algorithm development**

Number	Description
	Monte Carlo simulation of trigger algorithms. Develop coherent picture of all trigger levels and data rates.
1.2.8.2.2	**Software performance tests**
1.2.8.2.2.1	**Running in XDAQ**
	Implementation of simple level 3 trigger in XDAQ framework.
1.2.8.2.2.2	**Speed measurements**
	Measurement of CPU time performance of level 3 trigger algorithms. Refinement of algorithms as needed.
1.2.8.2.3	**Beam test**
1.2.8.2.3.1	**Preparation for beam test**
	Preparation involves development of software for front-end readout, run control, event logger, integration with event builder and level 3 trigger
1.2.8.2.3.2	**Beam test**
	Test beam run of combined preradiator-calorimeter system
1.2.8.2.4	**Design modification and review**
	Develop needed design modifications based on experience of beam test. Culminates in preliminary design review of the level 3 trigger on 4/30/07.
1.2.8.2.5	**Trigger procurement (25%)**
	Procurement of 25% of the hardware needed for the level 3 trigger. 1. 100 PC's. Unit PC cost estimated at monarchcomputer.com 10-GHz Xeon, single processor. 2GB RAM. 2 dual-port gigabit ethernet cards.
1.2.8.2.6	**Final design test**
	Tests with the "25%" event builder and L3 trigger. Monte Carlo events for input, passed through event builder and L3 trigger systems. Performance checks of the hardware. Culminates in final design review on 4/30/08.
1.2.8.2.7	**Trigger procurement (75%)**
	Procurement of remaining level 3 trigger and event logger hardware. 1. 300 PC's, 2. disk array

1.2.8.2.8   **Integration**

Installation of L3 trigger, integration with L1 trigger, run control, event logger, event builder

1.2.8.2.9   **Administration**

Life of experiment. 1/2 time computer/network system administrator to take care of routine maintenance of event builder, level 3 trigger, network hardware

1.2.8.3   **Hardware co-processor**

The speed of the level 3 trigger may be increased significantly by building dedicated hardware to perform parts of the trigger calculations. This may be needed if commercially available PC's are not powerful enough to provide the level 3 trigger rejection

1.2.8.3.1   **Preliminary design**

Exploration of co-processor architectures, communication with host CPU, RAM, interface to PCI Express

1.2.8.3.2   **Prototype**

Implementation of trigger algorithm into silicon. Iterations with prototypes. Culminates in preliminary design review.

1.2.8.3.3   **Final design**

Prototype of final design. Tests with Monte Carlo events. Culminates in final design review.

1.2.8.3.4   **Final design review**

1.2.8.3.5   **Fabrication/production**

Production/testing of probably several hundred co-processor boards

1.2.8.3.6   **Installation and integration**

1.2.8.4   **Online software**

The online software is the glue that holds the DAQ system together. It includes a run controller, a user interface, event logger, interfaces to the event builder, to the L1/L3 triggers, to the slow control, and to online monitoring/calibration tasks.

1.2.8.4.1   **Online software System Development**

1.2.8.4.1.1	**Simple online system running in XDAQ framework**
1.2.8.4.2	**Beam test**
1.2.8.4.2.1	**Preparation for beam test**
	Preparation involves development of software for front-end readout, run control, event logger, integration with event builder and level 3 trigger
1.2.8.4.2.2	**Beam test**
	Test beam run of combined preradiator - calorimeter system
1.2.8.4.3	**Design modification and review**
	Refine design of the online system based on the performance in the beam test. Culminates in preliminary design review on 4/30/07.
1.2.8.4.4	**Prototype and test**
	Tests with the "25%" event builder and L3 trigger. Monte Carlo events for input, passed through event builder and L3 trigger systems. Culminates in final design review on 4/30/08.
1.2.8.4.5	**Final design review**
1.2.8.4.6	**Integration**
	Integration with L1/L3 trigger, run control, event logger, event builder, front-end electronics, slow control